

Bellwork: 11/3/11

$$\begin{aligned} \textcircled{1} \quad \frac{1}{3}x - 3 &= \left(\frac{3}{4}x + 9\right) \cdot \frac{1}{2} \\ 4x - 36 &= 9x + 108 \\ -9x &\quad -9x \\ \hline -5x - 36 &= 108 \\ +36 &\quad +36 \\ \hline -5x &= 144 \\ \frac{-5}{-5} \quad \frac{-5}{-5} & \\ \boxed{x = -28.8} \end{aligned}$$

$$\begin{aligned} f(x) &= 3x - 1 \\ g(x) &= 2x + 2 \end{aligned}$$

$$\textcircled{2} \quad (f \cdot g)(x) =$$

$$(3x - 1)(2x + 2)$$

$$\begin{aligned} 6x^2 + 6x - 2x - 2 \\ \hline \boxed{6x^2 + 4x - 2} \end{aligned}$$

$$f(x) = \frac{2}{5}x - 5$$

$$y = \frac{2}{5}x - 5$$

$$x = \frac{2}{5}y - 5$$

$$\left(\frac{5}{2}\right)x + 5 = \cancel{\frac{2}{5}}y \left(\cancel{\frac{5}{2}}\right)$$

$$\frac{5}{2}x + \frac{25}{2} = y$$

$$f^{-1}(x) = \frac{5}{2}x + \frac{25}{2}$$

$$5(x+5) = \cancel{\frac{2}{5}}y \left(\cancel{5}\right)$$

$$\frac{5x+25}{2} = \cancel{\frac{2}{2}}y$$

$$\frac{5x+25}{2} = y$$

$$f(x) = 1 - x^3$$

$$y = 1 - x^3$$

$$x = 1 - y^3$$

$$\frac{x-1}{-1} = \frac{-y^3}{-1}$$

$$\sqrt[3]{-x+1} = y$$

$$\sqrt[3]{-x+1} = y$$

$$f^{-1}(x) = \sqrt[3]{-x+1}$$

### Verifying That Functions are Inverses

Two functions are inverses if:

$$f \circ f^{-1}(x) = x \quad \text{and} \quad f^{-1} \circ f(x) = x$$

$$f(f^{-1}(x)) = x \quad \text{and} \quad f^{-1}(f(x)) = x$$

Determine whether the following functions are inverses using composition.

4.)  $f(x) = 4x + 1$

$$f(g(x)) = x$$

$$f\left(\frac{x-1}{4}\right)$$

$$\cancel{4}\left(\frac{x-1}{\cancel{4}}\right) + 1$$

$$x - 1 + 1 = x$$

$$g(x) = \frac{x-1}{4}$$

$$g(f(x)) = x$$

$$g(4x+1)$$

$$\frac{(4x+1)-1}{4} = \frac{4x}{4} = x \quad \checkmark$$

$$f(g(x))$$

$$g(f(x)) =$$

Verifying That Functions are Inverses

Two functions are inverses if:

$$f \circ f^{-1}(x) = x \quad \text{and} \quad f^{-1} \circ f(x) = x$$

5.)  $f(x) = x - 3$

$$f^{-1}(x)$$

$$g(x) = -x + 3$$

$$f(g(x))$$

$$f(-x+3)$$

$$(-x+3) - 3$$

$$-x$$

$$g(f(x))$$

Not inverses

$$f(x) = x + 5$$

$$g(x) = x - 5$$

$$f(g(x)) =$$

$$f(x-5)$$

$$(x-5) + 5$$

X

$$g(f(x))$$

$$g(x+5)$$

$$(x+5) - 5$$

X

yes it is  
an inverse

$$f(x) = 3x - 9 \quad g(x) = -3x + 9$$

$$f(g(x))$$

$$f(-3x + 9)$$

$$\begin{aligned} & 3(-3x + 9) - 9 \\ & -9x + 27 - 9 \\ & \underline{-9x + 18} \end{aligned}$$

~~Not inverses~~

~~P. 122~~

~~29-36~~